CLAIMS

1. An apparatus for elucidating reaction dynamics of photoreactive compounds, comprising:

means for applying a magnetic field at a region of interest (ROI);

means for illuminating said ROI with a probe beam;

means for collecting light emitted by said probe beam; and

means for analysing said collected light.

2. The apparatus according to claim 1, wherein means for applying a magnetic field, and said means for collecting light are placed in a housing.

3. The apparatus of claim 2, wherein said housing further includes means for applying a therapeutic beam.

4. The apparatus of claim 2, wherein said housing includes a pulse oximeter, an oxygen electrode, or both.

5. The apparatus according to claim 1, wherein said means for applying a magnetic field include at least one permanent magnet or at least one coil.

6. The apparatus according to claim 5, wherein said means for applying a magnetic field are adapted be turned on or off; are adapted to be sinusoidally modulated; are adapted to vary a strength of said field over time; or a combination thereof; or are constant.

7. A method for elucidating reaction dynamics of photoreactive compounds in vivo, comprising the steps of:

a) irradiating a ROI with a probe beam;

b) recording the tissue fluorescence, phosphorescence and absorption characteristics at at least one wavelength;

c) administering a photoreactive agent;

d) irradiating the ROI with the probe beam;

e) recording the luminescence intensity and lifetime and absorption characteristics of the ROI at at least one wavelength when **B** = 0 Tesla;

f) applying a magnetic field of a predetermined strength;

g) recording the luminescence intensity and lifetime and absorption characteristics of the ROI at at least one wavelength when **B** > 0 Tesla;

h) repeating steps f) and g) for different magnetic field strengths;

i) turning off said probe beam;

j) processing data obtained; and

k) displaying results obtained by said processing on a display.

8. The method of claim 7, wherein a therapeutic beam is employed, and wherein said method includes the step of turning on the therapeutic beam for a set time then turning it off, then repeating steps d) through i).

9. The method of claim 7, wherein said steps of recording and said step of performing PDT are simultaneous.

10. The method of claim 7, wherein the probe beam and the therapeutic beam are of the same wavelength and are generated from the same source.

11. The method of claim 7, wherein the probe beam and the therapeutic beam are of different wavelengths.

12. The method of claim 7, wherein the probe beam and the therapeutic beam use the same source and wavelength, and where the therapeutic beam is more intense than the probe beam.

13. The method of claim 7, wherein multiple wavelengths are measured at the same time.

14. The method of claim 7, wherein said method further comprises the step of recording the tissues oxygenation and blood perfusion of the ROI either before administering the photoreactive agent; after turning off the probe beam; or both.

15. A method for elucidating reaction dynamics of photoreactive compounds from optical signals affected by an external magnetic field, comprising the steps of calibrating an apparatus as claimed in claim 1; administering a PDT drug; irradiating a region of interest and performing measurements.

16. An apparatus according to claim 1, wherein said means for analysing said collected light are adapted to generate processed data, including luminescence lifetime calculations, difference and ratiometric processing, correlating between at least two variables.

17. An apparatus according to claim 16, wherein said processed data is outputted visually as a map or a graph.